The Afghanistan Engineering Support Program assembled this deliverable. It is an approved, official USAID document. Budget information contained herein is for illustrative purposes. All policy, personal, financial, and procurement sensitive information has been removed. Additional information on the report can be obtained from Firouz Rooyani, Tetra Tech Sr. VP International Operations, (703) 387-2151.

TETRA TECH

MEMORANDUM

To: [redacted] (USAID) COR
[redacted], (USAID) POC

From: [redacted]. Technical Lead
[redacted], QA Engineer

Date: January 26, 2013

Re: WO-A-0088, Regak Bridge Warranty Inspection Report

On 12 January 2013, per work order WO-A-0088, one Tetra Tech (TT) AESP QA engineer accompanied the Louis Berger Group (LBG) team to the Uruzgan province for a warranty inspection of the Regak Bridge in the Shahidi Hassas district. The team left Kabul for Tirin Kot on 12 January 2013, stayed overnight at the Holland compound in Tirin Kot, then left Tirin Kot for Shahidi Hassas district, and spent the night at the COBRA Compound on 13 January 2013. On 14 January 2013, an army convoy escorted the team to the bridge for inspection. The following individuals were present during the inspection of Regak Bridge.

- [redacted], PE, AIRP Chief of Party, LBG/B&V JV
- [redacted], PE, AIRP TSP Sector Lead, LBG/B&V JV
- [redacted], Civil Engineer, AESP TT
- [redacted],President, Procons/Fayz/VKS JV

Regak Bridge is located in Shahidi Hassas district of the Uruzgan province. The bridge is constructed across the Shakur River. The Bridge is a steel truss design consisting of three spans of different lengths. The entire bridge superstructure is prefabricated and substructures are cast-in-place reinforced concrete. Photographs taken during the inspection are attached to this inspection report. The following are the findings from the bridge inspection.

1. **Superstructure Condition:**

   The prefabricated elements: the pins (clip, bearing, keeper angle), the bolts (for chord, long rocker, transom shear, deck T, brace) and panel members (chord, diagonal and vertical rockers, decking transom, brace, etc.) are generally in good condition. The steel members are galvanized and are still zinc covered, except for some of the bolts located at the bridge bearing plate that were observed to be oxidized. See Figure 8.

2. **Substructure Condition:**

   Abutment #A1 and A2 (reinforcement concrete breast wall and stone masonry wall), Pier #1 and Pier #2 (reinforcement concrete pier cap and column) are generally in good condition. The foundation of the abutment and piers were not inspected due to water in riverbed. See Figures 13 through 18.

3. **Approach slabs:**

   Reinforcement concrete approach slabs at Abutment #A1 and #A2 are in good condition. No deficiency was observed.

4. **Box culvert:**

   The box culvert at Station 0+542 km was constructed with stone masonry wall, plain concrete bottom slab and reinforcement concrete top slab. The culvert was in good condition but there was mud and debris at the bottom of slab on the inlet side. See attached Figure 27.

5. **Riprap:**

   The grouted riprap appeared to be in good condition. The weep holes were installed properly and no deficiency was noted.

6. **Stone masonry:**

   The stone masonry retaining walls and guard walls are in good condition and no deficiency was noted.

Problem areas:

- At Station 0+440 km on the left side of the roadway and at Station 0+550 km right side slope erosion due to storm water runoff has appeared. See Figure 35.
- Some of the bolts at abutment bearing observed to be oxidized. See Figure 8.
- Roadway at Station 0+580 to 0+620 km is washed out; this area appears to have washed out due to the lack of proper drainage. There are a few minor potholes and rutting on the roadway and some oversized rock pockets on the subgrade of the road. See attached Figures 36, 37 and 38.
- The local residences excavated an irrigation ditch on the roadway at Station 0+175 km which caused some rutting in that area. See Figure 30.

Conclusion:
The superstructures and substructures with their elements in Regak Bridge appeared to be in good condition and there were no visible signs of major deficiency. The oxidized nuts and bolts at the abutment bearing (Figure 8) need corrective measures. The roadway and the slab culvert mentioned under problem areas above will require maintenance work to be done.

The attached figures show all the inspected locations:

Site Visit Photos:

Figure 1: Site Inspection Team

Figure 2: View of Regak Bridge from right side, facing toward Abutment #A1

Figure 3: View of Regak Bridge from west side, facing toward Abutment #A2

Figure 4: View of the bridge deck slab, facing toward Abutment #A2

Figure 5: View of the bridge deck slab, facing toward Abutment #A1

Figure 6: View of bearing and keeper of bridge on Abutment #A1

Figure 7: View of the Bridge Bearing and Keeper Angle

Figure 8: Bridge Bearing Plate

Figure 9: View of right side guardrail, facing toward Abutment #A1

Figure 10: View of west side guardrail, facing toward Abutment #A1

Figure 11: View of floor beams, floor stringers, continuous side beams and truss bottom chords

Figure 12: View of Abutment #A1 with the stone masonry on both side retaining walls

Figure 13: View of Abutment #A2 with the stone masonry on both side retaining walls

Figure 14: View of stone masonry retaining wall on the left side of Abutment #A2

Figure 15: View of stone masonry retaining wall on the right side of Abutment #A2

Figure 16: View of pier cap and pier columns at Pier #1

Figure 17: View of Pier#1 and Pier #2

Figure 18: View of pier cap and pier columns at Pier #2

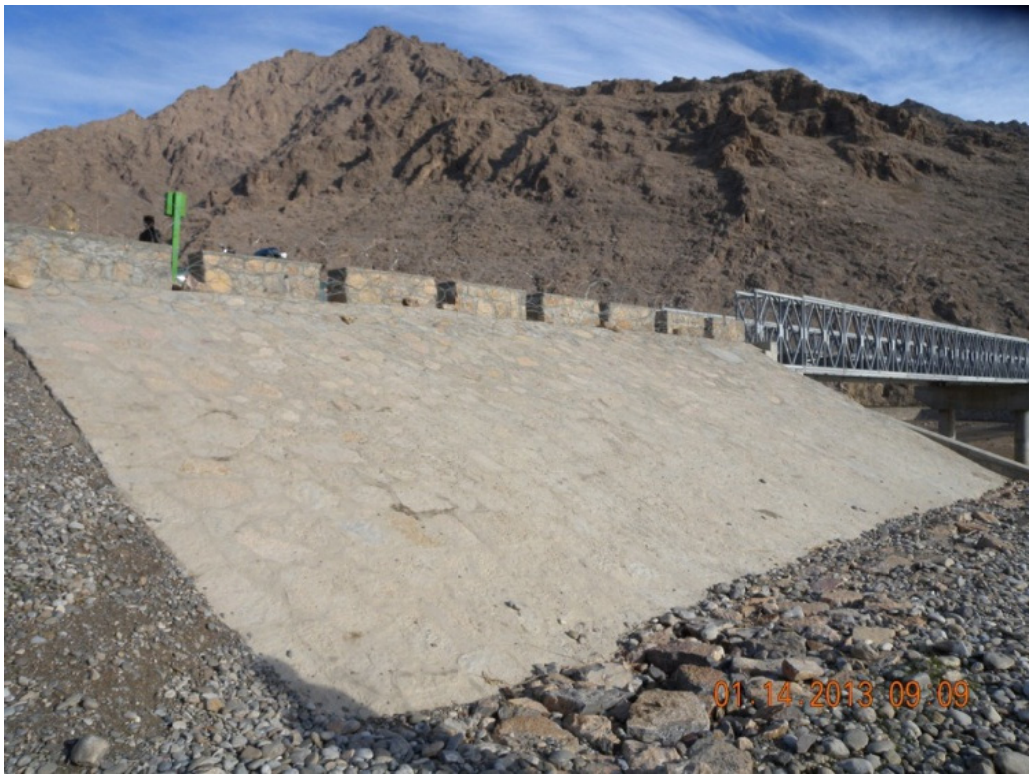

Figure 19: View of grouted stone masonry slope protection on the right side of roadway from station 0+270.8 to 0+290 km

Figure 20: View of grouted stone masonry slope protection on the west side of roadway from Station 0+270.80 to 0+290 km

Figure 21: View of grouted stone masonry slope protection on the right side of the roadway from Station 0+410 to 0+550 km

Figure 22: View of grouted stone masonry slope protection on the west side of the roadway from Station 0+410to 0+440 km

Figure 23: View of the grouted stone masonry slope protection on the west side of roadway from Station 0+410 to 0+440 km

Figure 24: View of stone masonry guard wall on the west side of the roadway from Station 0+270.80 to 0+290 km

Figure 25: View of the stone masonry guard wall on the east side of the roadway from Station 0+410 to 0+440 km

Figure 26: View of stone masonry guard wall on west side of roadway from Station 0+410 to 0+550 km

Figure 27: View of slab culvert inlet at Station 0+542 km with debris which needs clearing

Figure 28: View of the slab culvert

Figure 29: View of slab culvert outlet and the end point of stone masonry slope protection in which the roadway slope is eroded by rainfall at Station 0+550 km

Figure 30: View of excavated ditch across the roadway by local people for irrigation purpose at Station 0+175 km which caused some rutting in that area there is a need for a pipe culvert

Figure 31: View of roadway aggregate base from Station 0+180 to 0+290 km

Figure 32: View of roadway west side slope from Station 0+185 to 0+270.80 km

Figure 33: View of roadway east side slope from Station 0+185 to 0+270.80 km

Figure 34: View of the roadway east side slope from Station 0+440 to 0+540 km presents erosion due to rainfall

Figure 35: View of the east side slope of the roadway from Station 0+440 to 0+540 km presents erosion due to rainfall and lack of drainage

Figure 36: View of roadway's base course that presents minor rutting from Station 0+470 to 0+520 km

Figure 37: View roadway's base course presents severe rutting from Station 0+520 to 0+580 km

Figure 38: View of the roadway base course that is washed out due to lack of drainage from Station 0+580 to 0+620 km